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A COMPARISON OF THE TOXICITY OF NOTHOLAENA SINUATA AND N. SINUATA VAR. COCHISENSIS*

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DATA on the toxicity of a fern for cattle, sheep, and goats were presented in a previous publication under the title of *Notholaena sinuata*, var. *crenata* (Texas Agricultural Experiment Station Bulletin No. 611, 1942). Quite recently it was called to our attention that the nomenclature employed in that publication was erroneous and that the correct designation for the plant should have been *N. sinuata*, var. *cochisensis*. Therefore, the correct nomenclature is employed in this publication.

Both the species and the variety are common plants in the Trans-Pecos area of Texas, but as a rule they do not occur with equal abundance in the same locality. On the limestone hills and mountains of this area the variety is the more abundant of the two plants, while on the Davis Mountains, which are of igneous rock formation, the opposite condition prevails. Proof of the toxicity of the variety determined the cause of serious sheep losses in many limestone areas but left the status of the species in doubt. Information concerning the toxicity of the species was desired in view of the fact that there has been a gradual extension of the sheep industry into the Davis Mountains, where this plant is often found in considerable abundance.

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For exact information a comparison of the toxicity of the two plants growing in the same soil formation was desired. With this in view a place was selected in the Davis Mountains near Alpine, where both plants could be found in sufficient quantities to feed to experimental animals. This locality consisted of but a few acres with uniform soil conditions throughout, thus eliminating the factor of different soil formations which must be considered in an experiment of this nature. For the past four years both plants have been gathered in this locality and fed to both sheep and goats in both green and dry state. The results of the feeding tests are summarized in the accompanying table.

THE RESULTS OF FEEDING FERNS TO SHEEP AND GOATS

No.	Animal weight lbs.	Total lbs. fed	Per cent body wt.	Days fed	Results
		N. SINUATA (Lag. ex Sw.) Kaulf.			
S163	70	6.3	9.0	9	No ill effects
S169	55	4.5	8.1	6	No ill effects
S170	65	6.4	9.8	8	No ill effects
S139	70	8.4	12.0	8	No ill effects
S142	73	4.8	6.5	8	No ill effects
S169	55	7.0	12.7	7	No ill effects
S176	83	8.3	10.0	6	No ill effects
G92	70	5.6	8.0	8	No ill effects
G2879	50	6.0	12.0	6	No ill effects
		N. SINUATA var. COCHISENSIS (Goodding) Weath.			
S170	65	1.8	2.7	3	Marked toxic effects
S142	73	0.6	0.82	2	Marked toxic effects
S169	55	0.9	1.63	3	Marked toxic effects
S176	85	1.5	1.78	3	Marked toxic effects
G2879	50	1.5	3.0	3	Marked toxic effects

A total of seven sheep and two goats were fed *N. sinuata* for periods of 6 to 9 days. The total amounts of the plant fed during these periods varied from 6.5 to 12.7 per cent of the body-weights of the animals. No evidence of toxic effects were observed. On the other hand the variety *cochisensis* produced marked toxic effects in four of these animals with the largest dose equivalent to 3 per cent and the smallest 0.82 per cent of the body-weight, after a feeding period of but 2 to 3 days. The largest dose was probably in excess of the minimum amount which would have been required to produce toxic effects as numerous feeding tests with the variety have shown that one per cent of the body-weight constitutes a toxic dose for both

sheep and goats. The plan adopted was to feed the species to two animals and the variety to a third animal at the same time. The feeding of the latter plant was discontinued as soon as toxic effects appeared but the feeding of the species was continued until comparatively large amounts had been administered. Since no evidence of ill effects could be detected as a result of feeding the species, part of the animals which received this plant were later fed the variety in order to test the susceptibility of these animals, a procedure that was not required from past experience, as we have never found a sheep or goat which is resistant to the toxic principle in var. *cochisensis*. The results of the experimental feeding are in accord with limited field observations which have disclosed no reason for suspecting *N. sinuata* of being poisonous for livestock.

In view of the fact that the two plants occur in the same soil formation, that one is toxic and the other is not, that the two plants can be readily differentiated, the present classification is certainly inadequate. The gulf between these two plants should provide sufficient reason for classifying var. *cochisensis* as a species rather than a variety.

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A handy Guide to Aquatic and Marsh Vegetation.—A number of sumptuously illustrated and extensive volumes on aquatic and marsh plants have recently been published. These hardly demand comment here. A more modest study, with every indication of care in its preparation and up-to-date understanding of the plants is the pamphlet by Moyle and Hotchkiss on such plants of Minnesota.[1] As said, this study shows every indication that the authors have taken pains to check on the latest studies of the plants they discuss; only in two or three cases have they missed recent revisions. Their keys are clear and interesting, the drawings simple and readily recognizable, the text instructive and authoritative. The state of Minnesota is to be congratulated upon the production of so unpretentious and accurate a bulletin.—M. L. F.

[1] Moyle, John B., and Neil Hotchkiss. Aquatic and Marsh Vegetation of Minnesota and its Value to Waterfowl. Minn. Dept. Conservation, Technical Bull. no. 1. 122 pp., many illustrations, keys, etc. 1945.